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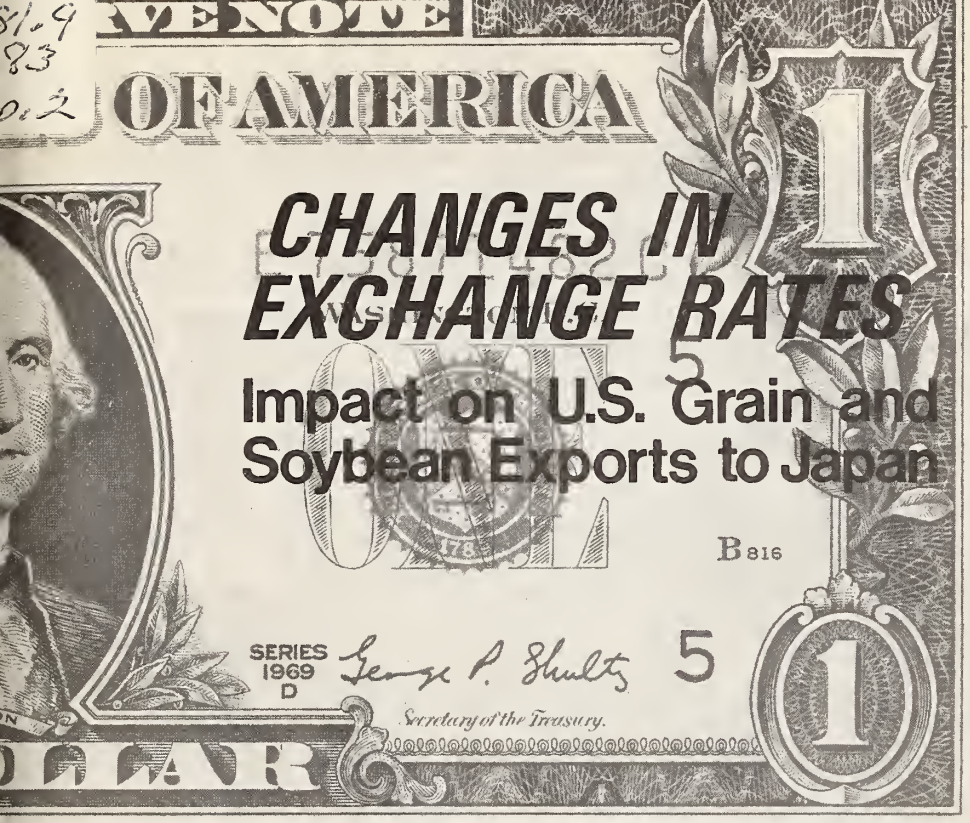

CHANGES IN EXCHANGE RATES

Impact on U.S. Grain and Soybean Exports to Japan

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ABSTRACT

Changes since 1970 in exchange rates between the Japanese yen and the currencies of Japan's major suppliers of wheat, corn, sorghum, and soybeans have had little effect on U.S. grain and soybean exports to Japan. U.S. sales of wheat to Japan were higher by only $5 million—3 percent of total value of the sales—in 1972 than they would otherwise have been, and higher by $15 million—4 percent of total sales—in 1973. Sales of U.S. soybeans to Japan were $26 million higher in 1972 and $48 million higher in 1973 than they would otherwise have been, about 7 percent of total sales in both years. No significant relationship was found between exchange rate changes and U.S. sales of corn and sorghum to Japan.

Keywords: Agricultural trade, Exchange rate, Grains, Japan, Soybeans.

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Washington, D.C. 20250 July 1974

SUMMARY AND CONCLUSIONS

Changes since 1970 in exchange rates between the Japanese yen and the currencies of Japan's major suppliers of wheat, corn, sorghum, and soybeans have had little effect on U.S. grain and soybean exports to Japan. U.S. sales of wheat to Japan were higher by only $5 million—3 percent of total value of the sales—in 1972 than they would otherwise have been, and higher by $15 million—4 percent of total sales—in 1973. Sales of U.S. soybeans to Japan were $26 million higher in 1972 and $48 million higher in 1973 than they would otherwise have been, about 7 percent of total sales in both years. No significant relationship was found between exchange rate changes and U.S. sales of corn and sorghum to Japan.

These conclusions were reached by estimating what would have happened if the exchange rates had held steady during 1971-73. The "what-if" situation was accomplished by developing import demand equations and estimating their parameters by ordinary least squares regression techniques. The import demand for 1971-73 was predicted by the equations using actual exchange rates and constant 1970 rates, and the differences between these results were attributed to changes in exchange rates.

CHANGES IN EXCHANGE RATES

Impact on U.S. Grain and Soybean Exports to Japan

By Bruce L. Greenshields, Economist,
Foreign Demand and Competition Division[1]

INTRODUCTION AND METHODOLOGY

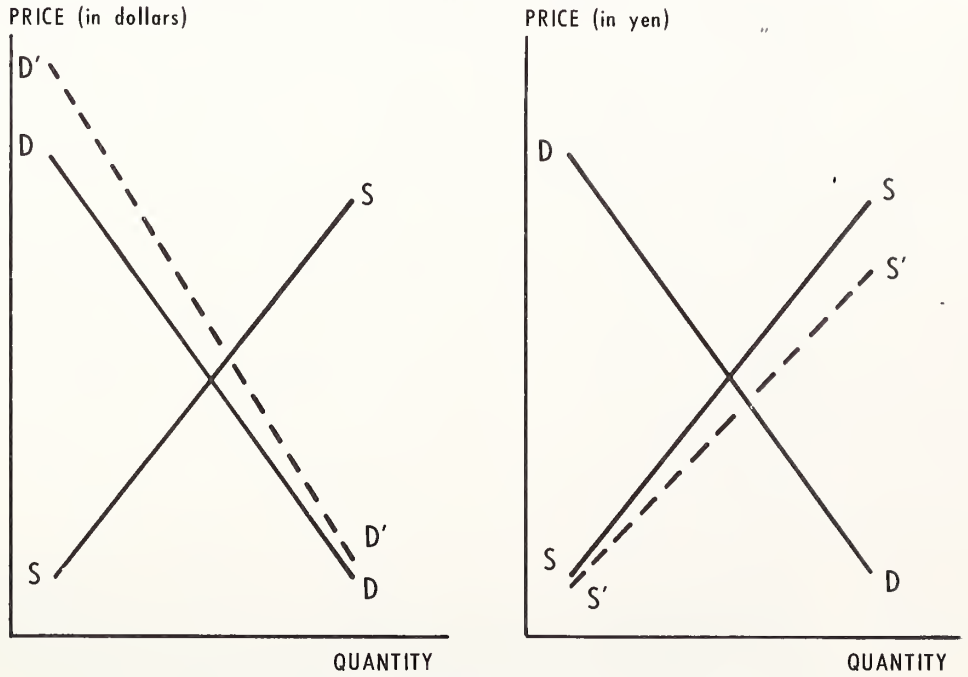
The U.S. dollar/Japanese yen exchange rate changed several times in 1971-73 after a long period of stability. The rate had been 360 yen per dollar from April 24, 1949, to August 28, 1971, when the yen floated. Changes that occurred thereafter resulted in a 32 percent increase in the purchasing power of the Japanese yen in the U.S. export market by the end of 1973.

To assess the impact of these exchange rate changes (along with those of other countries which export to Japan) on the quantity of U.S. grain and soybean exports to Japan, it is necessary to be able to estimate what the trade flow might have been in the absence of these changes. Other recent disturbances have been caused by delays in ocean transportation, dock strikes, decreases in crop production in countries other than the United States and Japan, substitution of Japanese rice for feed grains in the compound feed industry in Japan, decreases in petroleum supplies, changes in Japanese demand for stocks of grains and soybeans, and changes in the rate of growth of real income in Japan.

Changes in the dollar-yen exchange rate may be viewed as changes in the yen prices of U.S. exports to Japan, from the standpoint of Japanese demand. The initial effect on the U.S. export market of yen appreciation is to shift upward the export demand curve (in dollars) for U.S. exports to Japan (left side of figure 1). The upward shift is not parallel because a constant percentage is used. The export supply curve (in dollars) is unaffected. The effect in the Japanese market is to shift downward the import supply curve (in yen) of Japanese imports from the United States (right side of figure 1). The import demand curve (in yen) is unaffected. These initial shifts are caused by the price changes. They result in movements along the import demand schedule in the Japanese economy and along the export supply schedule in the U.S. economy, but not in shifts of these schedules. The change in quantity, equal on both sides of figure 1, is a function of both the supply elasticity for U.S. exports to Japan and the Japanese demand elasticity for U.S. imports.

[1] The author wishes to acknowledge the research assistance of Kent B. Gates, Junior Fellow from the College of William and Mary.

EFFECTS OF YEN APPRECIATION ON U.S. EXPORTS TO JAPAN



ADAPTED FROM CHARLES P. KINDLEBERGER, INTERNATIONAL ECONOMICS, 1973, P. 327.

Figure 1

The general method adopted here for measuring the change in quantity is from Clark (*6*).[2] Price changes resulting from changes in exchange rates are used to measure the effects on quantities. Japanese import demand elasticities are estimated using regression analysis. The domestic price and income effects of exchange rate changes, in both the United States and Japan, are not measured and are assumed to be zero. It has been estimated that these effects will only begin to have an impact on trade flows 2 or more years after the initial exchange rate change.[3]

To establish the upper limiting case (the maximum possible change in quantity that can be attributed to changes in the exchange rates), it is assumed that Japan confronts a perfectly elastic export supply curve. This partial equilibrium approach limits the relevant variables to exchange rates and estimates of Japanese import demand elasticities. The lower limiting case (no change in quantity due to exchange rate changes) occurs if the export supply curve is perfectly inelastic. In this latter case, the exchange rate changes would result only in higher U.S. dollar (world market) prices for the commodities considered.

Another important assumption is that the full extent of exchange rate changes is immediately passed along to Japanese importers. The first method used here to measure this is from Branson (*5*). By mid-1972 the appreciation of the yen from mid-1971 was 13.5 percent, weighted by imports. Under Branson's assumption of a 0.2 supply adjustment factor, 20 percent of the exchange rate change will be reflected in higher exporters' prices and 80 percent in lower yen prices. The dashed line in figure 2 represents the trend of Japan's import price index based on monthly data in 1969, 1970, and January-August 1971. In July 1972, the actual index was 93.9 and the trend value 104.4, which indicates a decrease in yen import prices of 10 percent. Given the supply adjustment assumption, this suggests that nearly all of the price effect of the 1971 exchange rate change was passed along by July 1972.

An alternative method is to compare Japan's import price index with the export price index of developed countries. By this measure it is apparent from figure 2 that the full effect of the exchange rate change is passed along almost immediately. Between the third quarter of 1971 and the first quarter of 1972, export prices increased 6 percent and Japan's import prices decreased 8 percent, yielding a 14 percent difference, slightly greater than the trade-weighted appreciation of the yen. The supply adjustment is implicit in the export price index.

An additional assumption is that responses to exchange rate changes are analogous to responses to relative price changes in general. Two arguments are made by Junz and Rhomberg (*13*), which probably tend to offset each other. On the one hand, the generally larger size of the exchange rate

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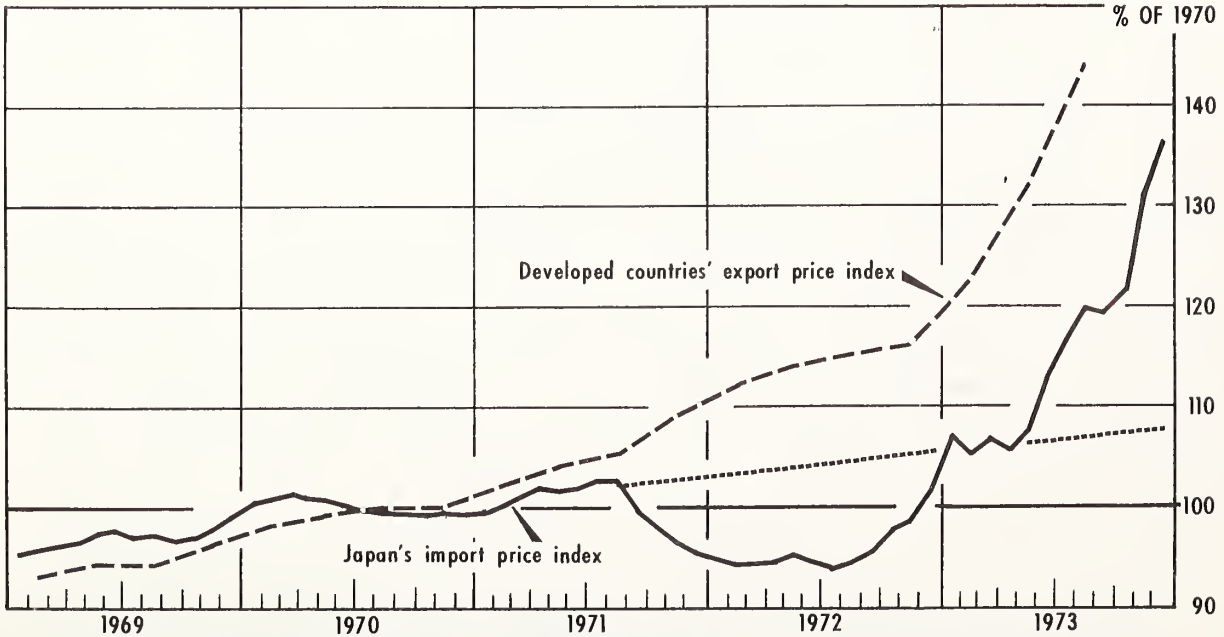
[2]Italic numbers in parentheses refer to references listed on p. 15.

[3]See Branson (*5*) and Junz and Rhomberg (*13*).

DEVELOPED COUNTRIES' EXPORT PRICE INDEX AND JAPAN'S IMPORT PRICE INDEX



DATA FROM BANK OF JAPAN, ECONOMIC STATISTICS MONTHLY, APRIL 1973, AND INTERNATIONAL MONETARY FUND, INTERNATIONAL FINANCIAL STATISTICS, VARIOUS MONTHLY ISSUES.

Figure 2

changes and the publicity attached to them could lead to more immediate responses. On the other hand, if the changes are designed to correct long-standing disequilibria, as in the case of the dollar-yen exchange rate, relatively large resource shifts with a correspondingly long response time may be necessary.

Finally, it is assumed that substitution between sources of supply of primary agricultural commodities in the 3-year period under analysis in this report depended on the availability of these commodities for export, and not on exchange rate changes.

Some of the factors which introduce rigidity into trade patterns are preferential arrangements, institutional features, contracts, and commercial and political relations between nations. Armington (*1*) adds support to this trade share rigidity assumption by stating that it is due partly to trade loyalties to particular products or sellers. Branson (*5*) offers the possibility that risk is a key element. If a buyer who switched suppliers would incur fixed transaction costs and lose a place at the head of a queue, it may be cheaper (in terms of variance of price and delivery time) for him to pay a higher price to a stable supplier.

RESULTS OF COMMODITY ANALYSES

Japan is the world's largest national importer of grains and soybeans. Increases in Japanese imports of U.S. wheat, corn, sorghum, and soybeans were analyzed to determine to what extent they were due to changes in exchange rates. These commodities accounted for over two-thirds of the total value of U.S. agricultural exports to Japan in 1973.

Wheat

The maximum percentages of the value of U.S. exports of wheat to Japan that can be attributed to changes in exchange rates, given the assumptions in the introduction, are 0.4, 2.8, and 3.8 for 1971, 1972, and 1973 respectively (column (j) of table 1).

The model used for calculation of the wheat import demand elasticities was the following:

$$Y = e^{(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u)}$$

Where:

Y = annual wheat imports, kilograms per capita

X_1 = wheat import price index, customs clearance basis, deflated by the consumer price index (1970 = 100)

X_2 = per capita private consumption expenditure index, at constant 1965 prices (1965 = 100)

X_3 = domestic wheat production, kilograms per capita

u = error term

The coefficients were estimated by linear regression (ordinary least squares method) with the following results:

$$\ln Y = 3.665 - 0.279X_1 + 0.003X_2 - 0.003X_3$$

standard errors	(0.132)	(0.001)	(0.007)
"t" values	(2.115)	(2.048)	(0.472)

R^2 = 0.947 *D.W.* = 1.046 *S.E.* = 0.064

Annual data were used (1955-73), yielding 19 observations and 15 degrees of freedom. The estimated values of Y from the equation are compared with actual data in figure 3.

The standard error of the estimate of Y, when converted into total tonnage, is larger than the 1971 quantity attributed to the exchange rate change (in column (d) of table 1), which is to say that the 1971 result is not significantly different from zero. The results for 1972 and 1973 are, however, significantly different from zero.

Wheat imports are under government control in Japan. This fact alone does not necessarily imply arbitrariness or preclude the possibility of estimating an import demand function. The Japanese Government determines how much wheat will be imported each year based on the following equation:[4]

$$M_t = (D_t + CO_t) - (DP_t + CO_{t-1})$$

Where:

M = Import demand
D = Total demand
CO = Carryout stocks
DP = Domestic production

Total demand is estimated by Japan's Food Agency from trend analysis. Stocks of imported wheat were relatively constant at about a

[4]This description of the Japanese Government wheat supply and demand program is from Wheat Associates (*21*).

Table 1. Japanese imports of specified commodities, total and from United States, and share attributable to exchange rate changes, 1971-73

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Japanese imports					U.S. exports to Japan				
Commodity and year	Actual	Calculated at actual exchange rates	Calculated at fixed 1970 exchange rates	(b)-(c) Maximum due to exchange rate changes	U.S. share of actual volume	(d) (e) Maximum quantity due to exchange rate changes	Average unit value, f.o.b.	(f) (g) Maximum value due to exchange rate changes	Actual value f.o.b.	(h)/(i) Maximum percentage of value due to exchange rate changes
	1,000 metric tons				*Percent*	*1,000 m.t.*	*Dol./m.t.*	*1,000 dollars*		*Percent*
Wheat:										
1971	4,872	4,985	4,966	19	53	10	61	610	152,132	0.4
1972	5,148	5,553	5,411	142	49	70	65	4,550	161,641	2.8
1973	5,386	5,364	5,160	204	67	137	113	15,481	404,758	3.8
Corn and sorghum:										
1971	8,818	8,555	8,473	82	48	39	59	2,301	222,147	1.0
1972	9,557	10,350	10,128	222	57	127	55	6,985	317,461	2.2
1973	11,513	12,133	11,968	165	81	134	89	11,926	896,693	1.3

Continued

Table 1. Japanese imports of specified commodities, total and from United States, and share attributable to exchange rate changes, 1971-73—Continued

Commodity and year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Japanese imports					U.S. exports to Japan				
	Actual	Calculated at actual exchange rates	Calculated at fixed 1970 exchange rates	(b)-(c) Maximum due to exchange rate changes	U.S. share of actual volume	(d) (e) Maximum quantity due to exchange rate changes	Average unit value, f.o.b.	(f) (g) Maximum value due to exchange rate changes	Actual value f.o.b.	(h)/(i) Maximum percentage of value due to exchange rate changes
	1,000 metric tons				*Percent*	*1,000 m.t.*	*Dol./m.t.*	*1,000 dollars*		*Percent*
Soybeans:										
1971	3,212	3,207	3,179	28	91	25	116	2,900	311,155	0.9
1972	3,396	3,765	3,539	226	92	208	126	26,208	375,365	7.0
1973	3,635	3,897	3,655	242	88	213	224	47,712	715,946	6.7
Total:										
1971	–	–	–	–	–	–	–	5,811	685,434	0.8
1972	–	–	–	–	–	–	–	37,743	854,467	4.4
1973	–	–	–	–	–	–	–	75,119	2,017,405	3.7

Sources: Columns (a) and (e)—Japanese Customs Bureau (*12*); Columns (g) and (i)—U.S. Bureau of the Census (*20*).

1.7-month supply from 1955 through 1972. In 1973 they were increased to about a 2.3-month supply, but this change was not included in the model. In any case, there was only a small difference between calculated and actual imports in 1973 (see figure 3).

To calculate the data for column (c) of table 1, the price variable, X_1, was adjusted to reflect what the yen prices would have been had there been no exchange rate changes in 1971, 1972, or 1973. In order to do this, the trade-weighted change in the purchasing power of the yen was computed. In table 2 the exchange rates are expressed in terms of the currencies of the major suppliers of wheat. The exchange rate changes in table 2 are changes in the purchasing power of the yen in the export markets of those major suppliers.

The changes in the yen prices of Japanese imports from those countries whose exchange rates are listed in table 2 are not shown, but they are the changes between the reciprocals of the rates shown. Had the yen prices not changed by those percentages (not shown), the yen prices would have been different by the same percentages as the exchange rate changes shown in table 2.

To clarify this point, consider only the dollar-yen rate and the change between 1971 and 1972. Assume, for the sake of simplicity, that 1 bushel of U.S. wheat cost the Japanese $1 both in 1971 and in 1972. In 1971 that bushel cost the Japanese 350.9 yen, and in 1972, 307.7 yen. So for the same yen expenditure in 1972, the Japanese could buy 43.2 yen more of wheat than in 1971. And in 1972 this 43.2 yen exchanged for 14.04 cents. Therefore, the Japanese purchasing power in the U.S. export market increased 14.04 percent, as shown in table 2.

The yen price of that bushel of wheat, however, *declined* from 350.9 yen in 1971 to 307.7 in 1972, or 12.31 percent. To adjust the 1972 price to what it would have been, had there been no exchange rate change, it must be increased 14.04 percent to return it to 350.9 yen.

Thus the percentage adjustments made to the 1971-73 prices to reflect what they would have been without any exchange rate changes are equivalent to the exchange rate changes as expressed in table 2.

The remaining step is to weight these changes by the share of Japan's import market of each of the major suppliers. The shares are expressed in table 2 as percentages of the total volume of Japanese wheat imports.

The adjusted wheat prices were plugged directly into the model to calculate the quantities in column (c) of table 1. The relevant price, income, and import substitute (quantity) elasticities from the original data in the wheat import demand equation are as follows:

Year	*Price*	*Income*	*Import substitute (quantity)*
1971	-0.26	+0.47	-0.01
1972	-0.22	+0.51	-0.01
1973	-0.31	+0.55	-0.01
mean	-0.41	+0.31	-0.04

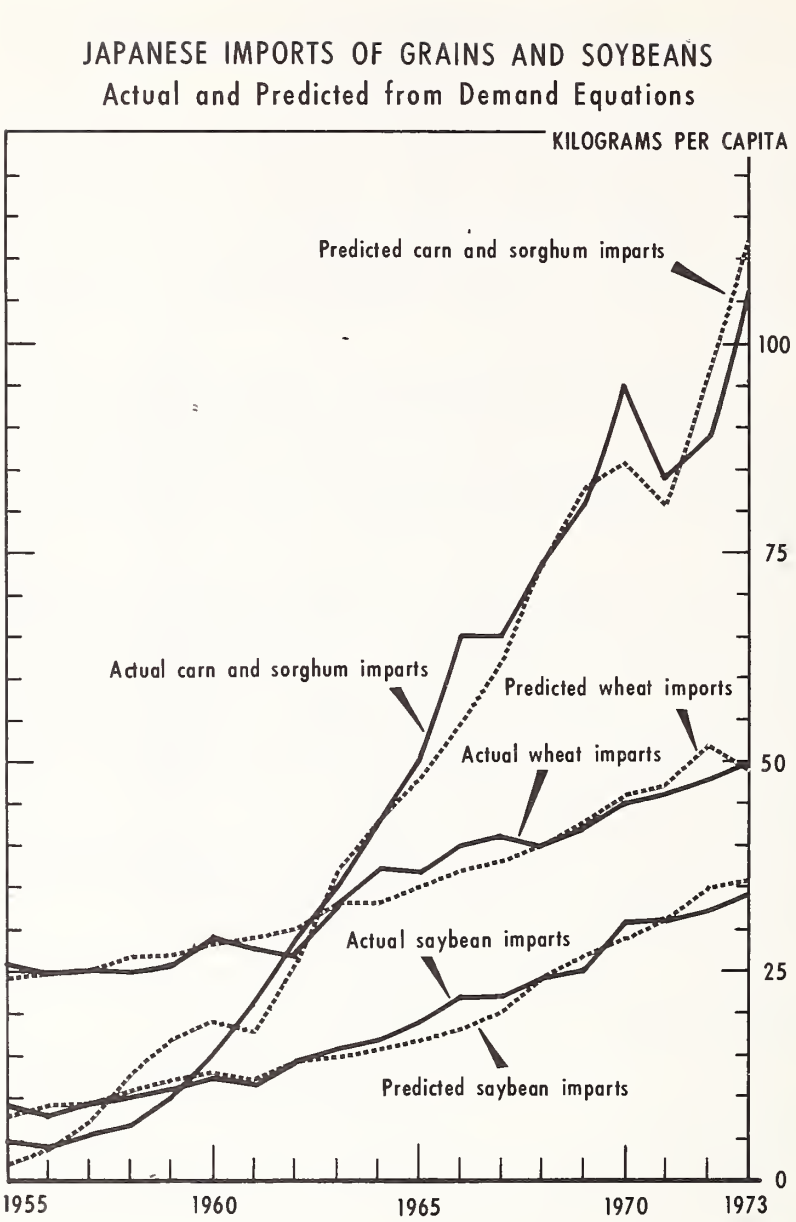

JAPANESE IMPORTS OF GRAINS AND SOYBEANS
Actual and Predicted from Demand Equations
KILOGRAMS PER CAPITA
Predicted corn and sorghum imports
Actual corn and sorghum imports
Predicted wheat imports
Actual wheat imports
Actual saybean imports
Predicted saybean imports
100
75
50
25
0
1955
1960
1965
1970
1973

Figure 3

Table 2. Exchange rates between Japanese yen and specified currencies, 1970-73, and trade-weighted changes in rates, 1971-73

Item	Argentine peso[1]	Australian dollar	Brazilian cruzeiro	Canadian dollar	Chinese yuan[2]	South African rand	Thai baht	U.S. dollar	Weighted changes
Actual exchange rates per 100,000 yen, annual averages:[3]									
1970	1,048	248.2	1,374	291.0	683.9	198.6	5,783	278.0	–
1971	1,302	252.2	1,511	287.9	646.0	203.5	5,928	285.0	–
1972	2,593	272.9	1,937	322.1	736.2	251.1	6,760	325.0	–
1973	3,178	261.3	2,232	366.6	756.1	255.1	7,478	366.6	–
	Percent								
Changes in exchange rates:									
1971	+24.24	+1.61	+9.97	–1.07	–5.54	+2.47	+2.51	+2.52	–
1972	+99.16	+8.21	+28.19	+11.88	+13.96	+23.39	+14.04	+14.04	–
1973	+22.56	–4.25	+15.23	+13.82	+2.70	+1.59	+10.62	+12.80	–
Weights:[4]									
Wheat:									
1971	0	22	0	25	0	0	0	53	+1.42
1972	0	27	0	24	0	0	0	49	+11.95
1973	2	3	0	27	0	1	0	67	+12.65

Continued

Table 2. Exchange rates between Japanese yen and specified currencies, 1970-73, and trade-weighted changes in rates, 1971-73—Continued

Items	Argentine peso[1]	Australian dollar	Brazilian cruzeiro	Canadian dollar	Chinese yuan[2]	South African rand	Thai baht	U.S. dollar	Weighted changes
Corn and sorghum:									
1971	15	11	0	0	0	8	10	48	+5.47
1972	6	8	0	0	0	14	9	57	+19.15
1973	5	4	0	0	0	5	4	81	+11.33
Soybeans:									
1971	0	0	0	0	9	0	0	91	+1.79
1972	0	0	1	0	7	0	0	92	+14.18
1973	0	0	5	0	6	0	0	88	+12.19

[1] Exchange rates apply to grain exports only.

[2] 1970-72 exchange rates from Pick (*17*). 1973 rate from Bank of Japan (*3*). 1972 rate is as of March 31. 1973 rate is as of April 30.

[3] Calculated from the trade conversion factors, International Monetary Fund (*11*), except where otherwise indicated.

[4] Percentage share of each country whose currency is listed in total volume of Japanese imports of the particular commodity, from the Japanese Customs Bureau (*12*). Where total of weights is not equal to 100, exchange rate change for residual suppliers is implicitly assumed to be zero.

It is assumed in this model that the quantity of import substitutes (domestic wheat production) does not depend on the price of imported wheat, because of the high support price for domestic wheat ($7.45 per bushel in 1973, compared with the average 1973 price of imported wheat of $3.20 per bushel).

Corn and sorghum

Column (j) of table 1 gives the maximum percentages of the value of U.S. exports of corn and sorghum to Japan that can be attributed to exchange rate changes, given the assumptions in the introduction.

The model used for corn and sorghum was the following:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u$$

Where:

Y = annual corn and sorghum imports, kilograms per capita

X_1 = corn and sorghum import price index, customs clearance basis, deflated by the consumer price index (1970 = 100)

X_2 = per capita private consumption expenditure index, at constant 1965 prices (1965 = 100)

X_3 = supply of major feeds other than imported corn and sorghum, including whole grain wheat and rice, wheat and rice bran, barley, and domestic corn, sorghum, and millet production, kilograms per capita

u = error term

The regression results were:

$$Y = 22.139 - 14.571X_1 + 0.818X_2 - 1.112X_3$$

standard errors	(8.174)	(0.080)	(0.347)
"t" values	(1.783)	(10.232)	(3.208)

R^2 = 0.983 *D.W.* = 1.231 *S.E.* = 5.004

The estimated values of Y from this equation are compared with actual data in figure 3.

The standard error of the estimate of Y, when converted into total tonnage, exceeds the values in column (d) of table 1 for all 3 years.

For details of the calculation of column (c) of table 1, refer to the section on wheat.

The elasticities derived from the corn and sorghum import demand equation are as follows:

Year	*Price*	*Income*	*Import substitute (quantity)*
1971	–0.17	+1.51	–0.63
1972	–0.12	+1.52	–0.57
1973	–0.12	+1.38	–0.42
mean	–0.43	+1.78	–0.82

Again it is assumed that the quantity of import substitutes does not depend on the price of imported corn and sorghum. Wheat bran and rice bran supplies probably depend on the demand for wheat and rice, even though some wheat millers actually produce bran as their primary product (*Senkan* mills). Whole grain rice was used in feeds in relatively large quantities in 1970-73 as part of the surplus rice disposal program. The price paid by the formula feed industry for that rice was below that of imported corn and sorghum. The quantities used in feeds (brown basis) were as follows:

Year	*1,000 metric tons*
1955-69 average	21
1970	274
1971	1,490
1972	1,200
1973	500

The bulge in this variable in 1971 and 1972 coincided with dock strikes in the United States and Japan and delays in ocean transportation in those years, but no attempt is made here to separate the two effects.

Soybeans

Column (j) of table 1 gives the maximum percentages of the value of U.S. exports of soybeans to Japan that can be attributed to exchange rate changes, given the assumptions in the introduction.

The model used for soybeans was as follows:

$$Y = e^{(\alpha + \beta_1 X_1 + \beta_2 X_2 + u)}$$

Where:

Y = annual soybean imports, kilograms per capita

X_1 = soybean import price index, customs clearance basis, deflated by the consumer price index (1970 = 100)

X_2 = per capita private consumption expenditure index, at constant 1965 prices (1965 = 100)

u = error term

The regression results were:

$$\ln Y = 2.662 - 0.457X_1 + 0.008X_2$$

standard errors	(0.137)	(0.001)
"t" values	(3.343)	(7.242)

$R^2 = 0.972$ $D.W. = 1.167$ $S.E. = 0.085$

The estimated values of Y from this equation are compared with actual data in figure 3.

As was the case for wheat, the standard error of the estimate of Y, when converted into total tonnage, exceeds the 1971 value in column (d) of table 1, but not the 1972 and 1973 values.

For details of the calculation of column (c) of table 1, refer to the section on wheat.

The elasticities derived from the soybean import demand equation are as follows:

Year	*Price*	*Income*
1971	-0.49	+1.25
1972	-0.44	+1.33
1973	-0.52	+1.45
mean	-0.65	+0.81

An import substitute quantity variable was not used because domestic soybeans are used in the soy food industry and do not compete against U.S. soybeans destined for the Japanese crushing industry (about 85 percent of U.S. soybean exports to Japan).

REFERENCES

1. Armington, Paul S.
   The Geographic Pattern of Trade and the Effects of Price Changes. *Staff Papers*, International Monetary Fund, Vol. XVI, No. 2, pp. 179-199, July 1969.

2. _____
   A Theory of Demand for Products Distinguished by Place of Production. *Staff Papers*, International Monetary Fund, Vol. XVI, No. 1, pp. 159-178, March 1969.

3. Bank of Japan.
   Economic Statistics Monthly. Tokyo, April 1973.

4. _____
Price Indexes Annual and *Export and Import Price Indexes Monthly*. Tokyo, various issues.

5. Branson, William H.
The Trade Effects of the 1971 Currency Realignments. *Brookings Papers on Economic Activity 1*, The Brookings Institution, Washington, D.C., pp. 15-58, 1972.

6. Clark, Peter B.
The Effects of Recent Exchange Rate Changes on the U.S. Trade Balance. Unpublished manuscript. A preliminary draft was presented to the Annual Meeting of the Econometric Society, New York, December 28-30, 1973. Board of Governors of the Federal Reserve System, March 1974.

7. Economic Planning Agency, Japanese Government.
Economic Survey of Japan, 1972-73. The Japan Times, Ltd., Tokyo, August 10, 1973.

8. _____
Economic Survey of Japan, 1971-72. The Japan Times, Ltd., Tokyo, August 1, 1972.

9. Goolsby, O. Halbert and Spencer F. England.
World Monetary Conditions in Relation to Agricultural Trade. WMC-5, Economic Research Service, U.S. Dept. of Agriculture, November 1973.

10. Houck, James P., Mary E. Ryan and Abraham Subotnik.
Soybeans and Their Products. University of Minnesota Press, Minneapolis, 1972.

11. International Monetary Fund.
International Financial Statistics. Washington, D.C., various monthly issues.

12. Japanese Customs Bureau.
Japan Exports & Imports Monthly. Japan Tariff Association, Tokyo, various issues.

13. Junz, Helen B. and Rudolf R. Rhomberg.
Price Competitiveness in Export Trade Among Industrial Countries. *The American Economic Review*, Vol. LXIII, No. 2, pp. 412-418, May 1973.

14. Kindleberger, Charles P.
International Economics. Fifth ed., Richard D. Irwin, Inc. Homewood, Ill., 1973.

15. Moriya, Yuichi.
Impact of Further Upward Revaluation of the Yen. *Quarterly Forecast*, The Japan Economic Research Center, No. 22, pp. 25-28, January 1973.

16. Orcutt, Guy H.
Measurement of Price Elasticities in International Trade. *The Review of Economics and Statistics*, Vol. XXXII, No. 2, pp. 117-32, May 1950. Reprinted in The American Economic Association, *Readings in International Economics*, Richard D. Irwin, Inc., Homewood, Ill., 1968.

17. Pick, Franz.
Pick's Currency Yearbook. Pick Publishing Corp., New York, 1972.

18. Ridler, Duncan and Christopher A. Yandle.
A Simplified Method for Analyzing the Effects of Exchange Rate Changes on Exports of a Primary Commodity. *Staff Papers*, International Monetary Fund, Vol. XIX, No. 3, November, pp. 559-578, November 1972.

19. Rojko, Anthony S., Francis S. Urban, and James J. Naive.
World Demand Prospects for Grain in 1980. Foreign Agricultural Economic Report No. 75, Economic Research Service, U.S. Department of Agriculture, December 1971.

20. U.S. Bureau of Census.
Trade data provided U.S. Department of Agriculture on tape.

21. Wheat Associates, U.S.A.
Wheat Importation and Marketing in Japan. National Food Life Improvement Association, Tokyo, 1971.

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